

# 9/22 Preclass

Copy this chart & info onto a new piece of paper:

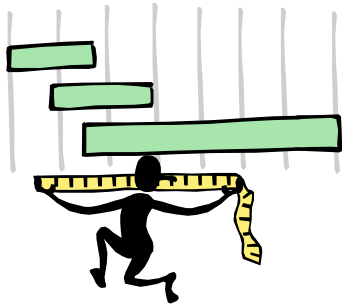
Kilo (K)	Hecto (H)	Deka (Da)	meters (m) liters (L) grams (g)	deci (d)	centi (c)	milli (m)
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$$\underline{0.001 \text{ Km}} = 0.01 \text{ Hm} = 0.1 \text{ Dam} = \underline{1 \text{ m}} = 10 \text{ dm} = 100\text{cm} = \underline{1000\text{mm}}$$

For units of **LITERS** or **GRAMS**, it works the same way:

$$\underline{0.001 \text{ KL}} = 0.01 \text{ HL} = 0.1 \text{ DaL} = \underline{1 \text{ m}} = 10 \text{ dL} = 100\text{cL} = \underline{1000\text{mL}}$$

$$\underline{0.001 \text{ Kg}} = 0.01 \text{ Hg} = 0.1 \text{ Dag} = \underline{1 \text{ m}} = 10 \text{ dg} = 100\text{cg} = \underline{1000\text{mg}}$$

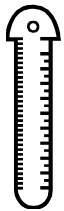
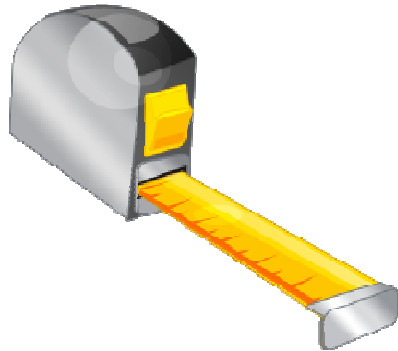


# International System of Units “SI” Units, or the Metric System

AP EnviSci

September 22, 2010

Ms. Johnson



# What do I write down??

- The text in GREEN.

- Example:

**9/22/10: Metric System & Conversions Review**

# Who uses the metric system?

- **Scientists ALL over the world**
- **Officially, 99% of ALL countries in the world use the metric system.**
- **Who's not (officially) using the International System?**
  - **The USA**
  - **Burma**
  - **Liberia**

# What is the metric system?

Because it's awesome! And rational!

- The metric system is an international *system* of measurement.
- The SI system uses decimals, or powers of 10:
  - 10 *millimeters* = 1 *centimeter*
  - 1000 grams = 1 *kilogram*
- In contrast, the English system uses unusual increments:
  - 16 oz. = 1 pound
  - 12 inches = 1 foot
  - 4 quarts = 1 gallon

# When was the metric system started?

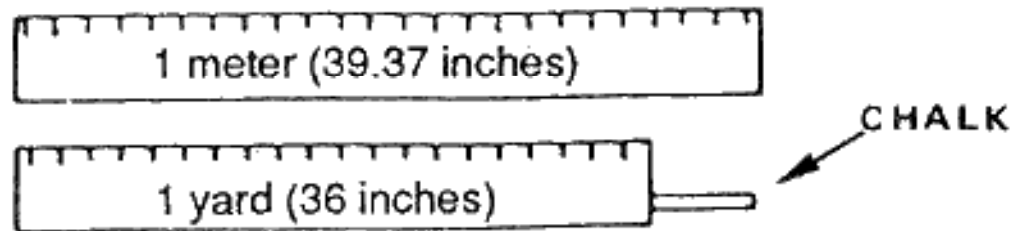
- First proposed in 1670 in France
- Adopted by almost the whole world during the last century
- The USA agreed to convert in the 1970's, but...
  - We didn't completely follow-through
  - Change is hard...



# Examples: meter

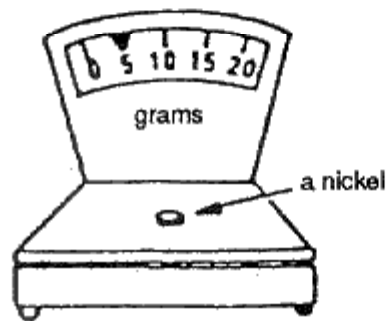
**1 meter**

**(or 1 m) = about a yardstick plus the length of a piece of chalk**



# Example: Gram

**1 gram  
(or 1 g) = about the mass of a large  
thumbtack**



**a nickel = about 5 grams (or 5 g)**

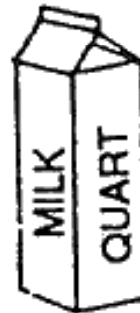
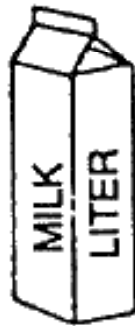


# Example: Liter

**1 liter**  
(or 1 L  
or 1 l)

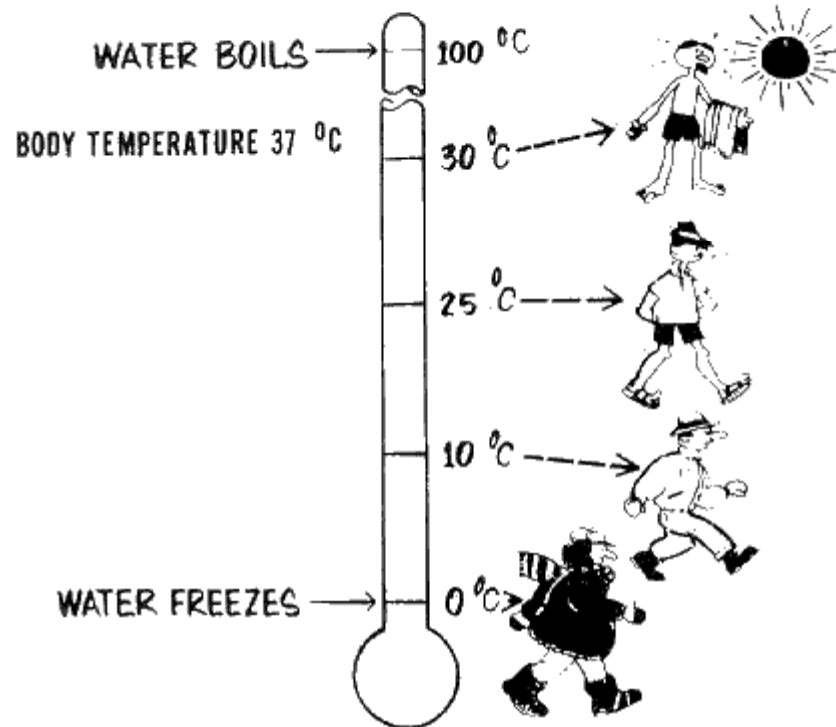
E Q U A L S

**1 quart plus**  
**1/4 cup = 1 liter**



# Examples: degrees Celsius

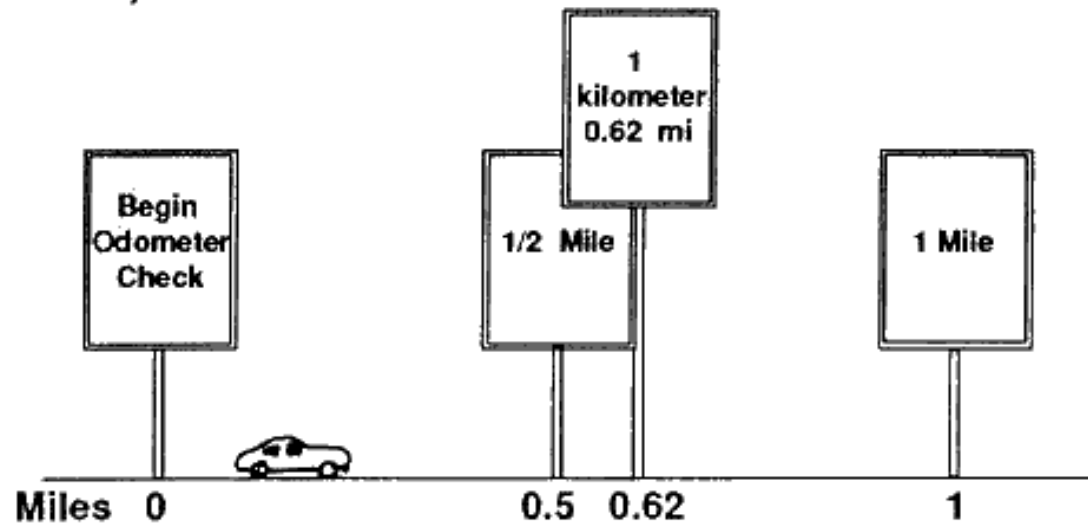
## Metric Temperature (degree Celsius)



# Example: Kilometer

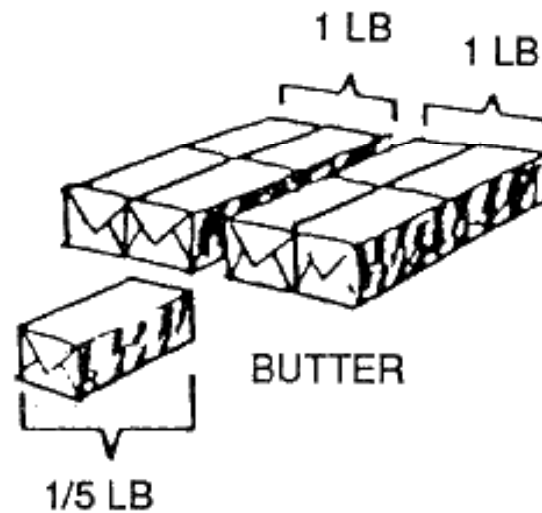
## 10 Km = 6 miles

**1 kilometer (or 1 km) = a little more than half a mile** (pronounced KILL-oh-meet-ur not kill-AHM-it-ur)



# Examples: kilogram

**1 kilogram (or 1 kg) = about the mass of 2.2 pounds of butter**



# Example: milliliter

**1 milliliter**

**(or 1 mL or 1 ml) = 1/5 tsp**

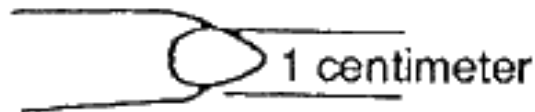


**1 tsp = 5 milliliters (mL)**



# Example: centimeter

**1 centimeter (or 1 cm) = the width of some part of your smallest finger or fingernail**



# How does the metric system work?

## Metric Prefixes tell it all...

This “metric scale” helps us convert units in the metric system:

Kilo (K)	Hecto (H)	Deka (Da)	meters (m) liters (L) grams (g)	deci (d)	centi (c)	milli (m)
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- **As you convert from one unit to another, the value does not change.**
  - Only how we describe the UNITS changes.
- **For example: Do you have the same *value* if you hold \$1, 10 dimes, or 100 pennies.?**
  - **Yes!** The only difference is the monetary UNIT that you hold.

# How it works, continued

## Metric Prefixes tell it all...

This “metric scale” helps us convert units in the metric system:

Kilo (K)	Hecto (H)	Deka (Da)	Meters (m) Liters (L) Grams (g)	deci (d)	centi (c)	milli (m)
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- To convert from one unit to the other, simply move the decimal point!
  - This multiplies by 10 each time you move the decimal to the right.
    - The # gets BIGGER
  - This divides by 10 each time you move the decimal to the left.
    - Then # gets SMALLER



# Units of Measure:

- **Meter (m):** the units of **length**
  - the straight-line distance between two points
- **Liter (L):** the units of **volume**
  - the size of an object in 3-dimensional space
- **Grams (g):** the units of **mass**
  - the measure of the amount of matter in an object
- **Seconds (s),** the units of **time**

# Prefixes

**Definition: Prefix = “to place in front”**

**Prefixes go *in front of* units of measure:**

**K      H      Da      --      d      c      m**

**But Ms. Johnson, how can I remember this?!?**

**King Henry Died --- drinking chocolate milk**

# Practice!

Directions: Write the word, underline the prefix, and list the type of measurement.

Example: cm = centimeter, length

- Kg =
- Hg =
- L =
- Dag =
- mm =
- dg =
- cL =
- mg

# Practice!

Directions: Write the word, underline the prefix, and list the type of measurement.

Example: cm = centimeter, length

1. m =

2. dm =

3. g =

4. Km =

5. mg =

6. dL =

7. DaL =

8. cm

So....

Which would you rather have: 1 H\$ or 1 c\$ ??

# Practice! Convert the following:

1) 1 m = \_\_\_\_\_ cm

2) 1 m = \_\_\_\_\_ Km

3) 1 Km = \_\_\_\_\_ cm

4) 5 Kg = \_\_\_\_\_ g

5) 5 Dag = \_\_\_\_\_ cg

6) 25 mL = \_\_\_\_\_ L

7) 75 dL = \_\_\_\_\_ L

8) 9.8 L = \_\_\_\_\_ HL

# Converting to change units

- Conversion factor: a # that expresses two different units that have the same *value*
  - Ex:  $100 \text{ pennies} = \$1$
- Using this as a fraction, we create the # “1”
  - Ex: 
$$\frac{100 \text{ pennies}}{\$1} = 1$$
- Multiplying any number by 1 does NOT changing it's *value*

# Create your bag of conversion factors:

- $1 \text{ m} = 0.0254 \text{ inches}$
- $2.2 \text{ lbs} = 1 \text{ Kg}$
- $1 \text{ kg} = 1000 \text{ g}$
- $100 \text{ cm} = 1 \text{ m}$
- Practice these problems



# Practice! Convert the following:

- 155 Hm = \_\_\_\_\_ m
- 155 m = \_\_\_\_\_ Dam
- 155 Kg = \_\_\_\_\_ cg
- 2 Kg = \_\_\_\_\_ Dag
- 2 Dag = \_\_\_\_\_ cg
- 6.1 mL = \_\_\_\_\_ L
- 3.14 dL = \_\_\_\_\_ L
- 0.6 L = \_\_\_\_\_ HL

# Where can we use the metric system?

- Everywhere!
- “Beginning January 1, 2010, the European Union Council Directive 80/181/EEC (Metric Directive) will allow the use of only metric units, and prohibit the use of any other measurements for most products sold in the European Union (EU). Going well beyond labeling, the Metric Directive will make the sole use of metric units obligatory in all aspects of life in the European Union, extending to areas such as product literature and advertising.”

From:

[http://ts.nist.gov/WeightsAndMeasures/Metric/upload/Business\\_Alert\\_2010.pdf](http://ts.nist.gov/WeightsAndMeasures/Metric/upload/Business_Alert_2010.pdf), Accessed 9/22/09